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Titel des Beitrags: Solution-based synthesis of copper nanowires and automated diameter analysis

Abstract: The demand for applications that require transparent conducting electrodes (TCEs) is rapidly growing and therefore, a low cost alternative to indium tin oxide (ITO), the prevailing TCE material, is needed. In this contribution, we present an environmentally friendly synthesis for CuNWs in aqueous solution at mild process temperatures. The synthesis employs Copper(II) chloride dihydrate as the copper-containing precursor, L-Ascorbic acid as the mild reducing agent and Oleylamine as the capping agent that directs the uniaxial wire growth. The optimum process temperature is found at 81 °C, which produces nanowires with a mean diameter of 100 nm and a mean length of 40 μm, respectively. With the aid of DiameterJ, the diameters of the CuNWs were analyzed in an automated and reproducible way from SEM-images. DiameterJ is a plugin developed for ImageJ and consists of two main components: the i) the segmentation part and ii) the analyzing part. The segmentation part of DiameterJ transforms the SEM image to a binary image, which is used for the analyzing part. As a result from the analyzing part, DiameterJ extracts two different diameters, the so called super pixel diameter and a fiber
diameter histogram. Further, both diameters show good agreement to the manual analysis for the same SEM-images.

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